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**A New Species of the genus *Ligia* (Crustacea: Isopoda: Ligiidae)  
from steep streams of Chichijima and Anijima Islands of the Ogasawara Islands\***

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**小笠原諸島父島・兄島の溪流から発見されたフナムシ属（甲殻亜門：等脚目：フナムシ科）の1新種**

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小笠原諸島父島と兄島の溪流から発見されたフナムシを新種 *Ligia torrenticola* として記載した。本種は純粋な淡水域に生息する種としては本属で初めての記録と思われる。本種は同じく父島の海岸に生息する *Ligia yamanishii* Nunomura ともっとも類似するが、尾肢が長いこと、顎脚鬚縫合線が完全に見られること、第1小顎の基節内葉先端に歯に鋸状のものが含まれることなどにより区別される。

**Key words :** Isopoda, Ligiidae, new species, *Ligia torrenticola*, steep streams, Ogasawara Islands, Japan

Hitherto, thirty-three species of the terrestrial isopod genus *Ligia* Fabricius 1798 are known in the world (Schmalfuss, 2003). Among them two species, *Ligia boninensis* Nunomura, 1979 and *Ligia yamanishii* Nunomura, 1990, have been recorded from the Ogasawara Islands (Nunomura, 1979, 1983; 1990, 1991, Tsuge, 2008). But, any species has not recorded from steep stream. Recently, members of the Laboratory of Biology, Hamamatsu University School of Medicine, collected some specimens of an unidentified species *Ligia* from a steep stream of Chichi-jima Island, Ogasawara Islands (Fig.1-2), and submitted those specimens to the senior author for identification. Later, additional specimens in better condition, collected from Chichi-jima and Ani-jima islands, were made available by T. Sasaki for study. In this paper, a new species, *Ligia torrenticola*, is described and illustrated. The new species is the first representative of the genus inhabiting in small streams on steep slopes.

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The type material is deposited in the National Museum of Nature and Science, Tokyo (NSMT), Toyama Science Museum, Toyama (TOYA) Kitakyushu Museum of Natural History and Human History, Kitakyushu (KMNH) and Osaka Museum of Natural History, Osaka (OMNH). Size of specimens is indicated by the body length (BL) measured from the midpoint of the anterior margin of the head to the midpoint of the posterior margin of the pleotelson.

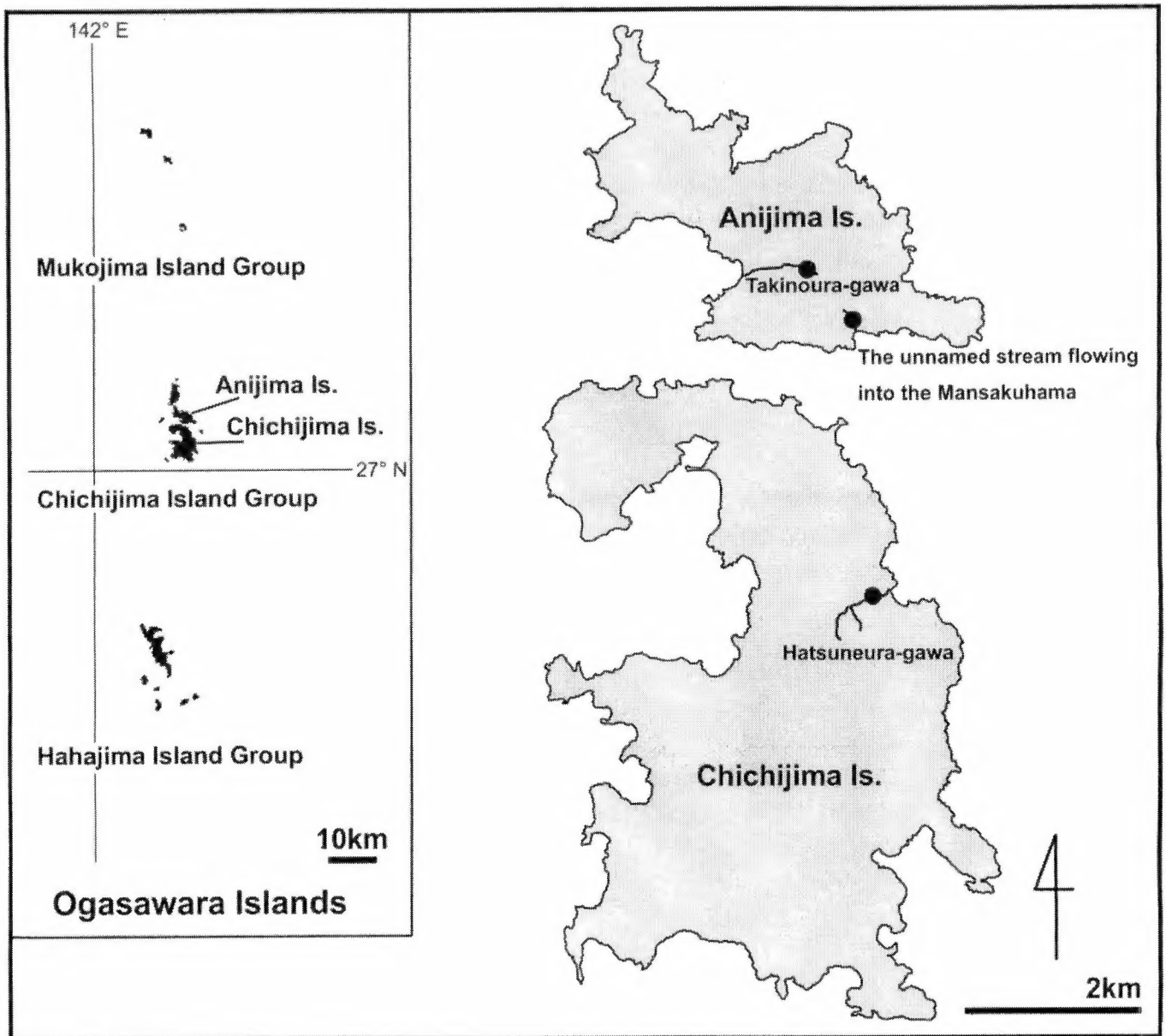


Fig.1 Map showing the sampling sites of *Ligia torrenticola* Nunomura, sp.nov.



Fig.2 Aspects of sampling sites, Hatsuneura-gawa River, Chichijima, of *Ligia torrenticola* Nunomura, sp.n. (taken by Sasaki)

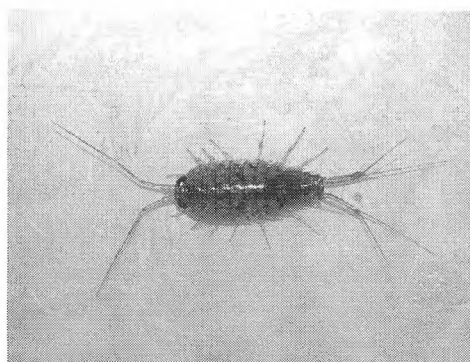
# Taxonomy

## *Ligia torrenticola* Nunomura, sp.n.

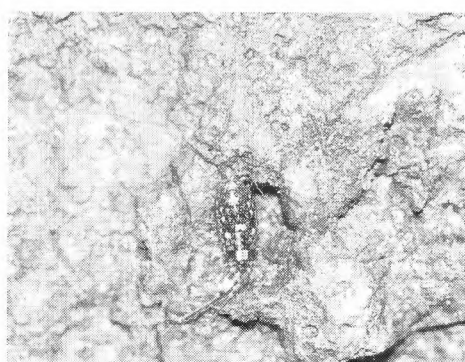
[New Japanese name: Nagare-funamushi]

(Figs.1-6)

**Material examined:** Holotype: male (BL 15.5 mm), NSMT-Cr 21253, upper stream of Hatsuneura River, 240 m from river mouth, Chichi-jima Island, Ogasawara Islands, 27°04'53.5"N, 142°13'20.1"E, 45 m in altitude, 17 June 2010, coll. T. Sasaki. Allotype: female (BL 18.4 mm), NSMT-Cr 21254, same data as holotype. Paratypes: 1 male (BL 8.6 mm), NSMT-Cr 21255, and 1 female (BL 15.0 mm), NSMT-Cr same data as holotype; 1 male (BL 13.2 mm), and 2 females (BL 7.3-9.0 mm) OMNH Ar-8372, same data as holotype; 1 male (BL 15.1 mm), TOYA Cr- 23271 and 1 female (BL 14.5 mm) TOYA Cr-23272, same data as holotype; 1♂ (paratype, BL 6.2 mm), TOYA Cr-23273 and 2♀ (BL 9.7~13.8mm) TOYA Cr-23291-23292, same locality as holotype, 23 June 2007, coll. Takahiko Hariyama. 1 Male, KMNH IvR 500, 496), 1 female (KMNH IvR 500, 497).



**Fig.3** *Ligia torrenticola* Nunomura, sp.n.  
Dorsal view of holotype (taken by Sasaki).



**Fig.4** Alive state of *Ligia torrenticola* Nunomura, sp.n. in Anijima.  
(taken by Sasaki).

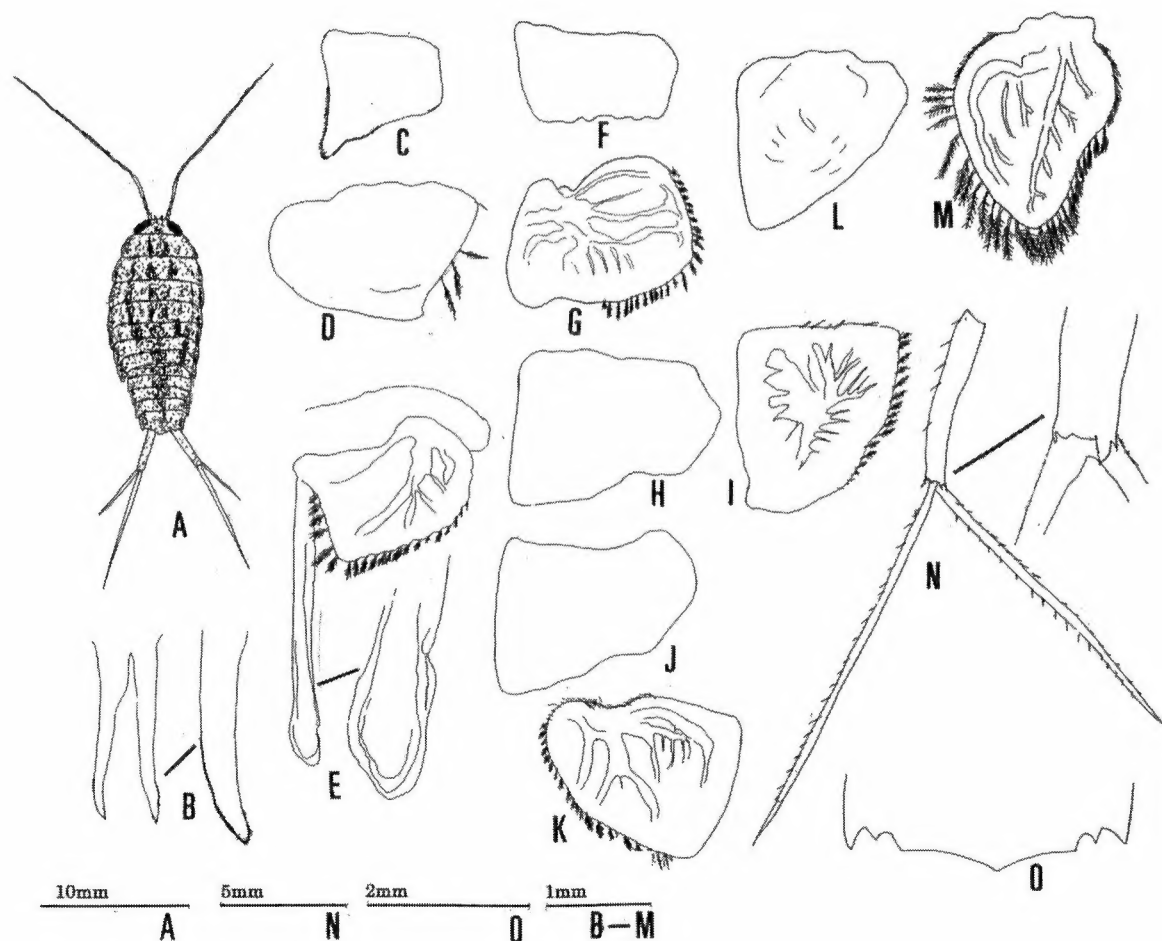
Non-type: 1♂4♀, upper stream of Takinoura-gawa, Anijima 27°07'01.2"N, 142°12'51.8"E, 160 m in altitude, 11 June 2010, coll. Tetsuro Sasaki; 6 ♀♀, down stream of a river of Anijima 27°06'42.4"N, 142°12'51.8', 150 m in altitude, coll. Tetsuro Sasaki.

**Description.** Body oval (Figs.3, 4, 5A), 2.2 times as long as wide (excluding antennae and uropods). Color generally pale gray, mottled with irregular darker markings on dorsal surface. Eyes reniform, each with about 750 ommatidia. Distance between eyes relatively narrow, 0.5 times of eye length. Surface of dorsal surface of body almost smooth with scattered many minute granules. Pleotelson with 2 pairs of relatively shallow concavities; medial area of posterior margin of pleotelson only slightly and roundly protruded.

Antennule (Fig.6A) small, first segment rectangular, second segment rectangular; terminal segment small and semicircular. Antenna (Fig.6B), reaching the middle part of seventh pereonal somite, composed of 5 peduncular and 25 flagellar segments.

Right mandible (Fig.6C) with incisor process 3-toothed; lacinia mobilis 4-toothed; 8 penicils behind lacinia mobilis; molar process wide. Left mandible (Fig.6D) with incisor process 3-toothed; lacinia mobilis 2-toothed; 6 penicils behind lacinia mobilis; molar process wide. Maxillula (Fig.6E) with 3 penicils on distal margin of inner endite; outer endite with 10 teeth; inner group of 6 teeth slender and sawlike, outer group of 4 setae stouter and smaller inner teeth. Maxilla (Fig.6F) bilobed; inner lobe with round apical margin; outer lobe with numerous hair. Maxilliped (Fig.6G) with endite bearing 10 plumose setae on distal margin; palp 5-segmented; segments 2-4 with short setae densely on inner margin and 1-3 setae at distal part on outer margin; terminal segment small, with short setae around margin.

Pereopod 1 (Fig.6H) with basis relatively stout, with 3-7 setae on each margin; ischium 0.7 times as long as basis,



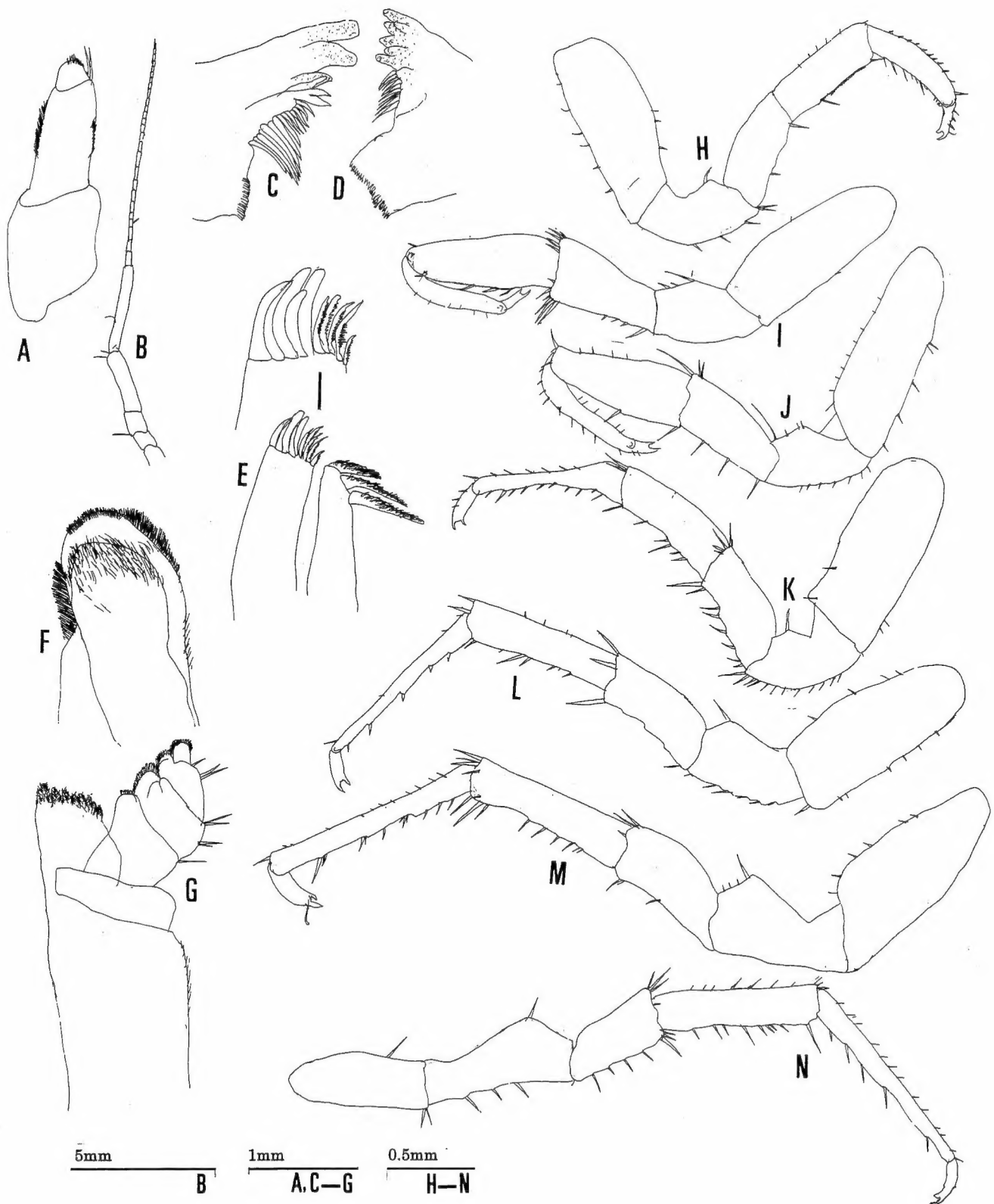
**Fig.5** *Ligia torrenticola* Nunomura, sp.n.

A, habitus, dorsal view; B, penes, ventral view; C, endopod of pleopod 1; D exopod of the same; E, left male pleopod, ventral view 2; F, right endopod of pleopod 2, ventral view; G, exopod of the same, ventral view; H, endopod right pleopod of exopod 3, ventral view; I exopod of the same; J, endopod of left pleopod 4, ventral view; K, exopod of the same; L, endopod of pleopod 5, ventral view ; M, exopod of the same, ventral view; N, left uropod, dorsal view; O, posterior margin of pleotelson, dorsal view (A-E, H-O, Holotype male; F-G, paratype female).

with 5 setae on inner margin and 1 seta at outer distal angle; merus 0.8 times as long as ischium, with 2-3 setae on inner margin; carpus 1.2 times longer than merus, with 2 setae on inner margin; propodus slightly longer than carpus, with 9-10 setae on inner margin and 11-12 short setae on outer margin; dactylus without any protuberance.

Pereopod 2 (Fig.6I) with basis 2.6 times as long as wide; ischium 0.7 times as long as basis, with 3 setae on outer margin; merus slightly shorter than ischium, with 2 groups of 5-6 setae on inner distal part and outer distal angle); carpus 1.3 times as long as merus, bearing 4 setae on inner margin, slightly becoming thicker in basal part; propodus 0.8 times as long as carpus, with 6-7 setae on outer margin.

Pereopod 3 (Fig.6J) with basis 3.1 times as long as wide, with 5 setae on inner margin and 10 short setae on outer margin; ischium half length of basis, with 7-8 setae on inner margin and 4 setae including a longer one on outer margin; merus 1.1 times longer than ischium, with 4 setae on inner margin and 3 setae including a longer one on outer margin on distal part of outer margin; carpus 1.2 times longer than merus, with 1 seta on inner margin and 5-6 setae on outer margin; propodus 0.9 times as long as carpus, with 5-6 setae on inner margin and about 10 setae on outer margin.



**Fig.6** *Ligia torrenticola* Nunomura, sp.n.

A, right antennule, dorsal view; B, right antenna, dorsal view; C, right mandible, ventral view; D, left mandible, ventral view; E, left maxillula, ventral view; F, left maxilla, ventral view; G, left Maxilliped, ventral view; H, left pereopod 1, frontal view; I-N, right pereopods 2-7 in male, frontal view (All; Holotype male).



Pereopod 4 (Fig.6K) with basis 2.4 times as long as wide, with 2 setae on inner margin and 2 setae on outer margin; ischium 0.6 times as long as basis, with 12 setae on inner margin and 1 seta on outer margin; merus slightly shorter than ischium, with 8 setae on inner margin and 5 setae on outer distal angle; carpus 0.9 times as long as merus, with 6 setae on inner margin and 2-3 setae on outer distal angle; propodus 1.2 times longer than carpus, with 9-10 setae on inner margin and 8 setae on outer margin.

Pereopod 5 (Fig.6L) with basis 2.5 times as long as wide, with 4-7 short setae on each margin; ischium 0.7 times as long as basis, with 5-6 setae on inner margin and 1 seta on outer margin; merus slightly shorter than ischium, with 3 setae on distal margin; carpus 1.6 times longer than merus, with 6-7 setae on inner margin and 2 setae on outer distal angle; propodus 1.2 times longer than carpus, with 6 setae on inner margin and 4-5 short setae on outer margin. Pereopod 6 (Fig.6M) with basis 2.5 times as long as wide, with 6-7 setae on outer margin; ischium 0.7 times as long as basis, with strong seta at outer distal angle; merus 0.8 times as long as ischium, with 2-3 setae on inner margin and outer distal angle; carpus 1.6 times longer than merus, with 8-10 setae on inner margin and 4-5 setae on outer distal angle; propodus 1.2 times longer than carpus, with 11-12 setae on inner margin and about a dozen short setae on outer margin.

Pereopod 7 (Fig.6N) with basis 3.5 times as long as wide, with 2 setae on distal part of inner margin and 1 seta on outer margin; ischium almost as long as basis, with 3 setae on inner margin and 1-2 setae on outer distal angle; merus 0.7 times as long as ischium, with 6 setae on inner margin and 4 setae on outer distal angle; carpus 1.7 times longer than merus, with 8-10 setae on inner margin and 11-12 setae on outer margin; propodus 1.3 times longer than carpus, with 5 setae on inner margin and 11-14 setae on outer margin.

Penes (Fig.5B) paired each penis about 8.0 times as long as wide, apical part tapering toward the tip, with much hair on distal part.

Pleopod 1 with endopod (Fig.5C) pentagonal, with setae much hair; exopod (Fig.5D) rounded, with 3-4 setae.

Pleopod 2 (Fig.5E) with endopod straight and its apical area slightly rounded; exopod round, with 4 setae around the margin.

Pleopod 3 with endopod (Fig.5H) pentagonal; exopod (Fig.5I) semicircular, with 24-25 setae on margin.

Pleopod 4 with endopod (Fig.5J) rectangular; exopod (Fig.5K) roundly triangular, bearing 19-27 setae.

Pleopod 5 with endopod (Fig.5L); exopod (Fig.5M) roundly triangular bearing 10-23 setae on margin.

Uropod (Fig.5M) 0.8 times as long as body length. Distal half of peduncle black in color. Peduncle of rami in length; endopod of 1.6 times longer than peduncle.

*Female.* Generally similar to male except for pleopod 2: Endopod of female rectangular (Fig.5F).

*Habitat.* The present new species dwells in steep mountain torrent of upper area of small freshwater streams (Fig. 5, 6).

*Remarks.* The present new species is most closely allied to *Ligia yamanishii*, a shore dweller of Chichi-jima Island, Ogasawara Islands (Nunomura, 1990), in having similar body color- pale gray, mottled with irregular darker markings on dorsal surface, swollen apical part of stylus on male pleopod 2, and absence of male first pereopod. But *L. torrenticola* is separated from *L. yamanishii* by the following features: maxillipedal palp of is completed segmented, whereas incomplete in *L. yamanishii*; antenna of *L. torrenticola* is longer and reaches 7th pereonal somite and flagellum composed 25 segments *L. torrenticola*, whereas the latter reaches medial part of urpodal basis and composed of 32 flagellar segment *L. yamanishii*; teeth are present on the outer endite of maxillula strongly serrated in *L. yamanishii*; ratio of rami to basis of uropod is 1.9~2.4 in *L. torrenticola*, whereas 0.7 ~1.5 in *L. yamanishii*; presence of 5 stronger saw-like 5 teeth on the maxillula are in *L. torrenticola*, whereas only 3 teeth in *L. yamanishii*.

*L. torrenticola* is also allied to another Ogasawara-species, *L. boninensis* (Nunomura, 1979) in having swollen apical part of stylus on male pleopod 2 and absence of male first pereopod, however, the former is separated from the latter by the following features: longer and reaching 7th pereonal somite and having 25 flagellar segment in *L. torrenticola*, whereas at most reaching 5th pereonal only 22 flagellar segments *L. boninensis*; ratio of rami to basis of uropod 1.9~2.4 in *L. torrenticola*, whereas 1.6~1.7 in *L. boninensis*; deeper concavity of posterior end of pleotelson in

*L. torrenticola*, its depth to pleotelson width is 5%, whereas, 3.5% in *L. boninensis*; teeth on outer endite of maxillula is 10 in *L. torrenticola*, whereas 6 in *L. boninensis*, and each tooth of the new species 2.0 times as long as that of *L. boninensis*; only 1 row of small denticles on apical part of endopod of male second pleopod in *L. torrenticola*, whereas 6-7 rows of denticles in *L. boninensis*; ratio of length to width of penes in the new species is 1.7 times as long as that of *L. boninensis*; number of penicils of both mandibles of *L. torrenticola* 11-12, whereas 6 in *L. boninensis*.

**Etymology.** The specific epithet is an adjective, a combination of the Latin "torrentis" (= roaring stream) and "cola" (= dwellers). This species dwells absolutely from the roaring stream of Chichijima, Ogasawara Islands.

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